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Rules: Function-Altering Contingency-Specifying Stimuli

Elbert Blakely and Henry Schlinger
Western Michigan University

Behavior analysts have traditionally defined rules as discriminative stimuli. Three problems with this interpretation are discussed. First, because the effects of rules are often delayed, and the effects of discriminative stimuli are immediate, classifying rules as discriminative stimuli violates the definitional requirements of the latter. Second, when rules are defined as discriminative stimuli, other truly unique effects of rules may be obscured. Finally, both rules and contingencies develop new behavioral relations; however, when rules are interpreted as discriminative stimuli, their effects are not readily compared with those of contingencies. As an alternative, we suggest that rules be interpreted as function-altering contingency-specifying stimuli. Implications of this function-altering interpretation for terminology and research strategy are discussed.

Key words: rules, rule-governed behavior, contingency-specifying stimuli, discriminative stimuli, function-altering effects

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In a recent paper, we described how contingency-specifying stimuli (CSSs) alter the functions of other events, and suggested that the analysis of the function-altering effects of CSSs had implications for use of the terms "rules" and "rule-governed behavior" (Schlinger & Blakely, 1987). In this paper, we describe those implications and argue that, in behavior analysis, the term "rule" should be reserved for function-altering CSSs.

FUNCTION-ALTERING CSSs: A RECAPITULATION

We previously described how CSSs can alter the function of discriminative and eliciting stimuli (SDs and CSs), establishing operations (EOs), reinforcing and punishing stimuli, and stimuli that can function in second-order respondent conditioning. For example, the descriptive CSS, "Points can be exchanged for money," might endow the points with the capacity to reinforce behavior. The CSS, "When you hear the bell, a shock will follow," can endow the bell with eliciting properties similar to those of the shock.

We also stated that to alter the function of other stimuli, CSSs must have certain formal properties. Specifically, CSSs must describe at least two components of a contingency, that is, either a relation between behavior and consequences, behavior and antecedent stimuli, two or more stimuli, or antecedent stimuli, behavior, and consequences. By definition, then, CSSs are verbal stimuli; nonverbal stimuli cannot be contingency-specifying. Although nonverbal operations (e.g., reinforcement, stimulus-stimulus correlation) can be function-altering, we addressed only the function-altering effects of CSSs. Moreover, we argued that the effects of function-altering CSSs are different than those of SDs: Function-altering CSSs alter stimulus functions, whereas SDs evoke behavior.

The term "contingency-specifying stimulus" is sometimes used synonymously with "rule" (e.g., Skinner, 1969, chap. 6). We, however, used "CSS" alone because it was more descriptive and had fewer connotations. Although not a technical term in behavior analysis (Brownstein & Shull, 1985), "rule" is nevertheless firmly entrenched in the behavioral lexicon. Therefore, an interpretation of rules based on their observed effects is important. Because rules have been defined with respect to their form as CSSs (Skinner, 1969), our previous analysis suggests that they might be profitably interpreted as function-altering. A function-altering interpretation of rules, however, differs from the prevailing view that

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classifies them as SDs. In what follows, we briefly discuss the origins of the current conception of rules as SDs, and then critique that interpretation. We then argue that the problems with rules as SDs are resolved by interpreting rules as function-altering CSSs. Finally, we describe some implications of this interpretation for terminology and research.

RULES AS SDs: A BRIEF HISTORY

The current interest in rules and rule-governed behavior can be traced to Skinner's (1966) paper "An Operant Analysis of Problem Solving," where he provided the first formal behavioristic reply to the assertion by some psychologists that perhaps all behavior was rule-governed (e.g., Brewer, 1974; Bruner, Goodnow, & Austin, 1956; Chomsky, 1957). Skinner argued that in verbal humans, behavior could arise either from direct contact with environmental contingencies or from verbal descriptions of those contingencies, the latter of which he termed "rules." Skinner's distinction between "contingency-shaped" and "rule-governed" implied that the behavior of nonverbal organisms could arise only from direct contact with contingencies and, by his definition, could not be rule-governed.

After distinguishing contingency-shaped from rule-governed behavior, Skinner (1966) defined rules, with respect to their form, as contingency-specifying stimuli that describe behavior and the controlling environment (e.g., antecedent and consequent stimuli). Thereafter, others have described these stimuli variously as "instructions" (e.g., Catania, 1984; Hayes, Brownstein, Zettle, Rosenfarb, & Korn, 1986; Skinner, 1969), "relational autoclitics" (Brownstein & Shull, 1985), and "directions" (Skinner, 1969). Skinner (1969) functionally defined rules as SDs: "How does a rule control behavior? . . . As a discriminative stimulus, a rule is effective as a part of a set of contingencies of reinforcement" (p. 148). Behavior analysts have, subsequently, generally supported this interpretation of rules (e.g., Baldwin & Baldwin, 1981; Catania, 1984; Galizio, 1979; Hayes et al., 1986; Shimoff, Catania, & Matthews, 1981; Vaughan, 1985; Zuriff, 1985).

Because behavior-analytic interpretations are in general constrained by the basic principles of behavior (Palmer, 1986), the analysis of rules as SDs is not surprising. Rules undoubtedly control behavior as antecedent stimuli, and the relations are apparently operant. Thus, Skinner and others could logically assume that rules function as SDs because no other operant antecedent function lent itself to an analysis of such events. However, there are difficulties with this interpretation.

RULES AS SDs: A CRITIQUE

At least three problems follow from classifying rules as SDs. First, many verbal stimuli that are termed "rules" do not meet the definitional requirements of SDs. Most definitions of the SD contain two features: the stimulus function and the history responsible for that function. Specifically, an SD immediately strengthens (i.e., evokes) behavior (Michael, 1983, 1986)[1] due to a history of differential reinforcement in the presence of the stimulus. If rules are interpreted as SDs, then their effects and history should conform to those of SDs. Notwithstanding the difficulty in discerning the relevant history, rules should at least evoke the behavior of interest.

Often, however, the effects of rules are observed only after long delays. For example, suppose a repairman tells his apprentice to "Say 'on' when the indicator

[1] Most accounts of stimulus control hold that behavior is more probable in the presence of the controlling stimulus (see, e.g., Mackintosh, 1977; Michael, 1980; Rilling, 1977; Terrace, 1966). This requirement does not easily lend itself to classifying stimuli of short duration, such as auditory CSSs, the effects of which are observed after stimulus-offset. Nevertheless, these definitions imply an immediate effect on behavior. Although defining the temporal parameters of "immediate" is an empirical issue and beyond the scope of this paper, increases in the probability of behavior observed hours or days after a discrete stimulus are not safely interpreted as discriminative effects. Other processes are probably involved.

light comes on," and the apprentice responds appropriately one hour later when the light is illuminated. Thus, the light, and not the rule, evokes saying "on." Moreover, the evocative effect of the light becomes more apparent as the delay between the rule and light-onset increases. For example, if the light were on when the rule was stated, the apprentice would have immediately said "on," making it appear that the rule evoked the behavior. Systematically introducing delays between the rule and light onset, however, would demonstrate that the light and not the rule evokes the behavior. The essential point is this: When a long delay between a rule and the behavior of interest is observed, this delayed effect is unlike that of an SD.

A second problem is that when rules are classified as SDs, their important function-altering effects may be obscured. As already stated, an SD only evokes behavior that has in the past been differentially reinforced in its presence. In contrast, rules alter the functions of the stimuli they describe. In the example above, the rule endowed the light with an evocative function. But classifying the rule as an SD presumes that the effect is evocative, therefore obscuring the important function-altering effect.

A third and more subtle problem must also be considered. Classifying rules as SDs obfuscates the essential similarity between contingencies and rules first suggested by Skinner (1966). In our view, that similarity may be described as follows: Both rules and contingencies alter the functions of stimuli and, thus, the behavioral relations involving those stimuli (Schlinger & Blakely, 1987; see also Vaughan, 1987). This function of rules and contingencies differs from that of SDs, which do not alter the functions of other stimuli but only evoke behavior that has in the past been differentially reinforced in their presence. Because the effects of SDs and contingencies are very different, it seems inappropriate to compare the effects of rules, when they are interpreted as SDs, with those of contingencies. But when rules are interpreted as function-altering CSSs, their effects are comparable to, though separable from, those of contingencies. We should note that the behavior generated by rules and contingencies constitute distinct response classes; nevertheless, both are due to histories involving function-altering operations.

An example illustrates this last point. One can bring button-pushing under evocative control of a red light by differentially reinforcing the response in its presence. A similar effect can be produced by the CSS, "Push the button only when the red light is on and you will receive money." Both the discrimination training and the rule endow the red light with an evocative function. Interpreting the rule as function-altering emphasizes the functional similarity of the rule and the contingency.

Although the discussion above addresses the problems of classifying rules as SDs, the reverse is also at issue: Many verbal stimuli that specify only behavior (e.g., "Come here," "Sit down," or "Watch out"!) are sometimes called "rules" (Catania, 1984; Skinner, 1969, 1974). But such stimuli, in these cases commands, have only evocative effects due to a history of differential reinforcement or because they are members of functional stimulus classes (e.g., Hayes, 1986). Therefore, the term "SD" seems sufficient and consistent with the observed effects. Moreover, we would not expect these non-CSSs to be function-altering; it is unlikely that they can alter the functional status of stimuli not described. Thus, we see no reason to confer on such stimuli the special status implicit in the term "rule."

CONCLUSIONS

The critique just presented has implications for the use of the terms "rule" and "rule-governed" behavior. We have proposed a function-altering interpretation of rules which is a departure from other views that classify rules exclusively as SDs (but see Hayes, 1986; Brownstein & Shull, 1985; Vaughan, 1987). We sug-

gest, though, that this change should not be unwelcome. Rules can alter the function of stimuli in many ways, and these function-altering effects would be more evident if the interpretation of rules focused on such effects. Furthermore, for greater precision and simplicity, stimuli that function only as SDs should be described as SDs.

The perspective of "rule-governed behavior" may also change. If the interpretation of such behavior is predicated on the traditional definition of rules (i.e., as SDs), then the term should be synonymous with "rule-evoked." Considering our objections to classifying rules as SDs, "rule-governed behavior" would be a misnomer. Behavior is not "governed" by rules in the sense that it is evoked by them. Rather, behavior is evoked by the events described by the rules (e.g., CSs, EOs, and SDs). If anything is "governed" or determined by rules, it is the functional relation between these events and behavior. But because the term "rule-governed behavior" may be irrevocably embedded in the behavioral vernacular, we do not suggest modifying it. We suggest only that when rule-governed behavior is considered, what may be "rule-governed" is a complete functional relation between a stimulus and behavior.

Finally, the definition of rules may influence the course and interpretation of research. When rules are defined as SDs, research would not need to focus on their function, the function presumably being an immediate strengthening of behavior like that of all SDs. The requisite history would also be clear. The effects, like those of all SDs, would be due to a history of differential reinforcement with respect to similar stimuli. When rules are defined as function-altering CSSs, however, the mechanism of action is not readily discerned. How a rule alters the function of stimuli, and the requisite history for such effects, are among the questions to be resolved. Recent reports (e.g., Devany, Hayes, & Nelson, 1986) suggest that this research would be of a very different nature, and may address the truly unique and important effects of rules.

SUMMARY

Rules and rule-governed behavior continue to be widely discussed by behavior analysts (e.g., Brownstein & Shull, 1985; Devany et al., 1986; Hayes, 1986; Schlinger & Blakely, 1987). Regardless of how behavior analysts ultimately interpret rules, however, the terminology should reflect the specificity of the phenomena of interest (Brownstein & Shull, 1985; Michael, 1986). Thus, in the present paper, we argued that when events function in ways adequately described by the basic behavioral principles, they should be described with the appropriate technical terminology (e.g., when events function as SDs, call them SDs, etc.). Moreover, we attempted to show that assigning a special term—"rule"—to functions for which we already have technical terms might impede the analysis of complex events. In addition, classifying rules as SDs belies the functional difference between the two kinds of stimuli; as a result, research may not investigate the relevant variables and mechanisms involved in the effects of rules. As an alternative, we proposed a function-altering interpretation of rules that we believe is consistent with, and descriptive of, the observed effects.

REFERENCES

Baldwin, J. D., & Baldwin, J. I. (1981). *Behavior principles in everyday life.* Englewood Cliffs, NJ: Prentice-Hall.

Brewer, W. F. (1974). There is no convincing evidence for operant or classical conditioning in normal, adult, human beings. In W. Weimer & D. Palermo (Eds.), *Cognition and the symbolic processes* (pp. 1–42). Hillsdale, NJ: Erlbaum.

Brownstein, A. J., & Shull, R. L. (1985). A rule for the use of the term, "Rule-governed behavior." *The Behavior Analyst, 8,* 265–267.

Bruner, J. S., Goodnow, J., & Austin, G. (1956). *A study of thinking.* New York: Wiley.

Catania, A. C. (1984). *Learning.* Englewood Cliffs, NJ: Prentice-Hall.

Chomsky, N. (1957). *Syntactical structures.* The Hague: Mouton.

Devany, J. M., Hayes, S. C., & Nelson, R. O. (1986). Equivalence class formation in language-able and language-disabled children. *Journal of the Experimental Analysis of Behavior, 46,* 243–257.

Galizio, M. (1979). Contingency-shaped and rule-governed behavior: Instructional control of hu-

man loss avoidance. *Journal of the Experimental Analysis of Behavior, 31,* 53–70.

Hayes, S. C. (1986). The case of the silent dog—verbal reports and the analysis of rules: A review of Ericsson and Simon's protocol analysis: Verbal reports as data. *Journal of the Experimental Analysis of Behavior, 45,* 351–363.

Hayes, S. C., Brownstein, A., Zettle, R. D., Rosenfarb, I., & Korn, Z. (1986). Rule-governed behavior and sensitivity to changing contingencies. *Journal of the Experimental Analysis of Behavior, 45,* 237–256.

Mackintosh, N. J. (1977). Stimulus control: Attentional factors. In W. K. Honig & J. E. R. Staddon (Eds.), *Handbook of operant behavior* (pp. 481–513). Englewood Cliffs, NJ: Prentice-Hall.

Michael, J. (1980). The discriminative stimulus or SD. *The Behavior Analyst, 3,* 47–50.

Michael, J. (1983). Evocative and repertoire-altering effects of an environmental event. *VB News, 2,* 21–23.

Michael, J. (1986). Repertoire-altering effects of remote contingencies. *The Analysis of Verbal Behavior, 4,* 10–18.

Palmer, D. C. (1986, June). *A behavioral interpretation of memory.* (Paper presented at the Summer Institute on Verbal Relations, Bad Kreuznach, Germany.)

Reynolds, G. S. (1975). *A primer of operant conditioning* (rev. ed.). Glenview, IL: Scott, Foresman.

Rilling, M. (1977). Stimulus control and inhibitory processes. In W. K. Honig & J. E. R. Staddon (Eds.), *Handbook of operant behavior* (pp. 432–480). Englewood Cliffs, NJ: Prentice-Hall.

Schlinger, H., & Blakely, E. (1987). Function-altering effects of contingency-specifying stimuli. *The Behavior Analyst, 10,* 41–46.

Shimoff, E., Catania, A. C., & Matthews, B. A. (1981). Uninstructed human responding: Sensitivity of low-rate performance to schedule contingencies. *Journal of the Experimental Analysis of Behavior, 36,* 207–220.

Skinner, B. F. (1966). An operant analysis of problem-solving. In B. Kleinmuntz (Ed.), *Problem solving: Research, method, teaching* (pp. 225–257). New York: Wiley.

Skinner, B. F. (1969). *Contingencies of reinforcement: A theoretical analysis.* Englewood Cliffs, NJ: Prentice-Hall.

Skinner, B. F. (1974). *About behaviorism.* New York: Knopf.

Terrace, H. S. (1966). Stimulus control. In W. K. Honig (Ed.), *Operant behavior: Areas of research and application* (pp. 271–344). New York: Appleton-Century-Crofts.

Vaughan, M. E. (1985). Repeated acquisition in the analysis of rule-governed behavior. *Journal of the Experimental Analysis of Behavior, 44,* 175–184.

Vaughan, M. E. (1987). Rule-governed behavior and higher mental processes. In S. Modgil & C. Modgil (Eds.), *B.F. Skinner: Consensus and controversy* (pp. 257–264). Barcombe, England: Falmer Press.

Zuriff, G. E. (1985). *Behaviorism: A conceptual reconstruction.* New York: Columbia University Press.